

Why was Michael so powerful?



Tomlin

BY BROOKS TOMLIN

When Hurricane Michael made landfall near Mexico Beach in Florida last October, it did so as one of the strongest storms in United States history. One measure of a hurricane's intensity and strength is barometric pressure. The lower the pressure, the stronger the

storm.

Only the unnamed 1935 Labor Day Hurricane (892 mb) which hit the Florida Keys and 1969's Hurricane Camille (900 mb) which hit Mobile, Ala., were stronger than Hurricane Michael (919 mb) at landfall.

Across the globe, average barometric pressure is roughly 1013 mb, and pressure differences cause wind flow. Lowering barometric pressures must increase wind speed to maintain their low pressure.

What were the factors which led to Hurricane Michael being so strong?

Like any hurricane, it had a center of circulation with ample convection. The circulation gained organization and strength over the western Caribbean and southern Gulf of Mexico, both of which have ample warm water to depth in early October.

Upwelling — subsurface cool water rising to the surface — can inhibit tropical system strengthening, but the vertically deep warmth of the western Caribbean Sea maintained the fuel for Michael to form and strengthen. Once over the Gulf of Mexico, further deep warm water continued to serve as high-octane fuel. The atmosphere was especially conducive for Michael to develop as well. Hurricanes like a tranquil atmosphere, vertically aloft. They do not like strong winds aloft, jet streams and dry air.

Cold fronts can cause a tropical storm or hurricane to weaken or dissipate, but Michael did not encounter any until after landfall. The dome of warm, humid air stretched far north from the Gulf of Mexico. As a matter of fact, on Oct. 8 and 9, Chicago had high temperatures of 85 degrees each day. There was ample tropical air and warm ocean waters for Hurricane Michael to strengthen.

As Hurricane Michael began to accelerate towards the Florida Panhandle, the barometric pressure continued to deepen, winds continued to strengthen and an approaching cold front (and associated jet stream) helped vent and disperse the highest clouds. Together, these features allowed Hurricane Michael to make landfall as a Category Five storm, the strongest hurricane possible.

This begs the question, "Are we likely to see more storms with the power of Hurricane Michael in the future?"

In a way, Michael was aided by fortune. The center of circulation formed and strengthened over a body of deep warm water. That same center of circulation traversed between Cuba and the Yucatan peninsula; any deviation just miles east or west would have caused land interaction with Michael, likely weakening the storm. A giant, warm, humid air mass stretched all the way north to the Great Lakes, aiding Michael's rapid development.

If any of these conditions are present for a future storm, we could witness a similar situation.

Brooks Tomlin is a Fox 35 meteorologist.



STEPHEN M. DOWELL/ORLANDO SENTINEL

Matthew washed out part of State Road A1A in October 2016 near Flagler Beach. The storm skirted Florida's east coast.

LESSONS

Continued from Page 4

and tearing up State Road A1A north of Daytona Beach.

A key and sobering eye-opener from Matthew was that for a storm traveling parallel with Florida's coastline, even a tiny error in the forecast for where it will make landfall can mean the difference between clobbering several cities or remaining offshore just enough to avert disaster.

Also maxing out as a Category 5 early in its journey, Hurricane Irma vexed residents and forecasters with frequent changes in its apparent route toward Florida.

It was the size of Texas as it finally churned north along a path just west of the center of the state's peninsula spine, flooding and damaging cities on both coasts.

The storm was blamed for more than 80 deaths in Florida, epic episodes of evacuees stranded on roads and massive sewage spills caused by the worst outages on record for many utilities.

As its executives would later apologize for when speaking to state lawmakers, Duke Energy in particular was revealed to be poorly prepared for the storm; the utility's response was hampered by equipment failures and poor coordination. Duke is Central Florida's largest power provider.

Last year, Michael was one of the most powerful storms ever to strike the U.S. It hit near Mexico Beach, a seaside community east of Panama City, with a population of a little more than 1,100 residents.

Michael Brennan, branch chief of the National Hurricane Center's hurricane-specialist unit, said the storm revealed the heightened risk of coastal living.

"Michael went from basically forming to making landfall as a Category 5 in three days," Brennan said. "People think they are going to have a lot of time to watch a storm like an Irma come all the way across the Atlantic and have days and days to think about it and get ready. Michael was a pretty stark reminder that that is not always the case."

Michael was yet another reminder of what emergency managers routinely urge: Floridians need to have a plan at the start of the season.

"Know what you need to do, know what your risks are in a storm surge, know what your vulnerability is to wind and freshwater flooding," Brennan said. "Know if you are asked to leave your home where you are going to go and

how you are going to make that happen and do that quickly."

Brennan said Mexico Beach was spared greater tragedy by its size.

"The challenge with a storm like Michael that hits a more populated area is you could have thousands of people left in an area that's vulnerable to storm surge as opposed to less than a hundred left in Mexico beach," Brennan said. "It's a small enough area there that you were able to get people out on the last day."

"We have multiple major metropolitan areas that are very vulnerable to storm surge and have millions of people living in them and hundreds of thousands of people you will need to evacuate," he said. "It's a big challenge with a short-fuse storm like a Michael. People have to be ready to go very quickly."

Michael formed as a tropical depression on Oct. 7 and made landfall three days later as a Category 5 with winds of 160 mph. "We got away with one there because the storm intensified by 45 mph in the last 24 hours before landfall," said Masters of Weather Underground.

"That's a big increase and it makes it tough for warnings and evacuations in vulnerable areas," Masters said.

Masters said the U.S. needs to invest far more heavily on research into the forecasting of hurricane intensity.

"We can't have a situation where we blow the intensity forecast," he said. "The hurricane center did have Michael intensifying but they missed it by 35 mph. When it was 24 hours before landfall, their forecast was for a storm that was 35 mph less than what actually occurred."

If Michael had taken aim at Tampa Bay, its forecasted strength would have triggered a storm surge of 18 feet. But its actual strength would have spawned a surge of 30 feet, Masters said.

"You've got a huge population there. You've got evacuation routes that go underwater well before a storm arrives and a storm-unaware population to a large extent," Masters said. "The population there has not been exposed to a hurricane of any kind, a Category 1 or stronger since 1946."

Masters said researchers are finding that the rate of intensification of Atlantic hurricanes has increased in recent years.

"Rapid intensifiers are becoming more common, and that's bad news for unprepared populations," Masters said.

kspear@orlandosentinel.com